

# Technical Documentation

## Vågen Screw Conveyor

### 1.Introduction

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#### 1.1 Product: Vågen Screw Conveyor

#### 1.2 Design

This machine is designed according to NS-EN 12100:2010 and NS-EN 5639 and is covered by the Machine directive definition.

Vågen internal quality assurance system, rely on the requirements in NS-EN ISO 9001:2008.



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## 2. Description

### 2.1 Support systems

Before the machine is made operational, all necessary support systems have to be connected according to the plant drawings, instructions, specifications and requirements.

The machine itself is enclosed, except the openings for filling and discharge, which have to be protected by the customer and end-user during installation, with safeguards or by connecting equipment.

#### 1. Interlock

The screw conveyors has grating and/or covers and tools are needed to open it.

**WARNING! Do not remove the grating before all power is switched off.**

#### 2. Gear/motor coupling.

The machine, gear, motor and coupling are enclosed from producer. Safeguards are installed over rotating parts.

#### 3. Operating of control systems: (not included in Vågen AS delivery)

It is common to install automatic remote control system with switch for start/stop where the system is switch off in «stop» position. Operating and control systems have to be supplied with a short particular information of the operation system for easy understanding in case of an emergency situation.

All electric connections must be carried out by qualified personnel and in accordance with local requirements.

#### 4. Silos, hoppers, feeders, support pipe etc.


All supports that shall be connected to the conveyor or inlet/outlet, have to be of correct dimensions and installed in predefined locations. Supporting structure must be manufactured to carry the weight of fully loaded machine plus min.150 kg for weight of a repairman with toolbox.

#### 5. Hazardous situations:

If the machine is to be used in a dangerous atmosphere (e.g. Ex.) or if the personnel are exposed to other hazards, extra protection and safeguards may have to be installed.

### 2.2 Personal safety equipment

Products from Vågen are designed, constructed and produced according to the latest safety standards. Special local or inter company requirements may not be covered. Investigate local requirements before start.

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## 2.3 Noise

The noise level of this screw conveyor run empty, does not reach the limit of 70 dB measured on the working place.

## 2.4 Function description:

Vågen screw conveyors are calculated for feeding of loose bulk products. Primary use of a screw conveyor is to transport and/or work as a feed conveyor. The screw itself generates a moderate mixing effect on the mass.

## 2.5 Expected use:

This screw conveyor is meant for transport/feeding of bulk products. Expected use means operation under supposed condition as given in the delivery contract and function description chap.2.4 and the screw conveyor is not finished installed before all relevant supporting systems are connected.

## 2.6 Limits in use:

This machine must not be used for duties other than those which it has been designed for.

Pay attention to the description and do not start the machine before all support system are well connected.

### 2.6.1 Jamming of goods.

If goods are jammed, the motor protector may switch off.

Jamming may occur if the machine is used under other conditions than it is designed for.


When jamming, it is necessary to:

#### **First, switch off all power, then:**

1. Open the inspection cover and take out the material/parts which have been jammed.
2. Release the cover and grating and than take out the material/part which have been jammed.
3. Another helping method might be to reverse the rotation, and by that try to loosen the part(s) which has been jammed.

**Do the reverse rotation carefully. This method must only be used in a very short period and under close monitoring** (because there is no outlet at the other end of the conveyor, and the conveyor might overflow at the end).

It might be necessary to dismantle the screws. Refer to chapter 4.3 Dismantling.

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### 3. Commissioning

#### 3.1 Transport and reception

During transport it is very important that the screw conveyor is fixed so it does not come loose and fall down/out. Qualified personnel have to check that the screw conveyor is securely fastened. When moving and handling the screw conveyor under transport and installation it is important to use correct loading and handling equipment. It is recommend to use two straps, turned or coiled around the screw. If there is any danger that the screw conveyor can twist under the operation the straps must be securely fixed to each other. If using a fork lift, the screw conveyor has to be fastened on a wooden pallet.

Immediately after receiving the screw conveyor, it must be inspected for any transport damages.

Vågen does not undertake any responsibility for damages caused by incorrect transport, installation, handling and operation,

#### Storage

Please refer to technical documentation of all hydraulic and electric parts for storage instructions.

#### 3.2 Installing

The screw conveyor shall be installed properly with sturdy support. It is necessary to use separate, individual foundations and supports. Personnel must have an easy access to the machine and technical personnel must be allowed enough space to carry out services and inspections.

The machine is produced according to customer's requirements. Professional service personnel must carry out the installation to ensure that fixation and adjustments of the equipment is satisfactory.


The machinery must be:

- Placed on a rigid structure or separate foundation without risk for fractures or break down.

- With an easy to understand operating arrangement.

- Safe start and stop function, including emergency stop.

- Possibilities for a safe disconnection from the actuator (electric, hydraulic/pneumatic).

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### 3.3 Before setting into service

**Warning!** Before setting the machine into service, the responsible person shall ensure that all supports, conveyors and plant systems are connected and are in accordance with drawings and specifications. Make sure no personnel are in harm's way, close to or under the machine before start up.

Only qualified electrical personnel in according to local regulations must carry out electric connection and repair.

## 4. Use

### 4.1 Application and operation

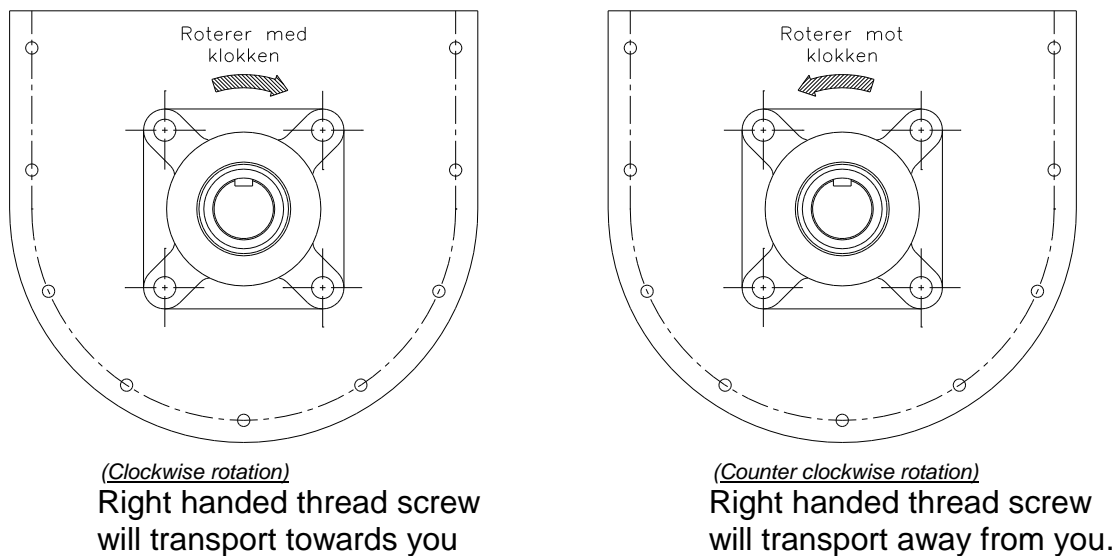
Material (loose bulk material) is continuously transported along the screw and refilled through the inlet. Material is discharged through the outlet discharge.

The screw conveyor feeds a particular volume each rotation and is therefore also suitable as a continuous dosing conveyor.

Outlet is placed in the bottom of the trough or as an open end.


#### 4.1.1 Rotation direction

Principles for rotation direction on screw conveyors and transportation directions of mass is shown on fig. 4.1



Opposite for left handed thread screw.

Fig.: 4.1

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## 4.2 Maintenance and cleaning

To ensure good performance, it is important to lubricate bearing and change coupling and gear oil in intervals, and also change parts which are worn out (typically gasket and sealing rings)

### 4.2.1 Routine of inspection

a) Daily inspection to check that all covers and inspection openings are closed.

Greasing of bearings and coupling.

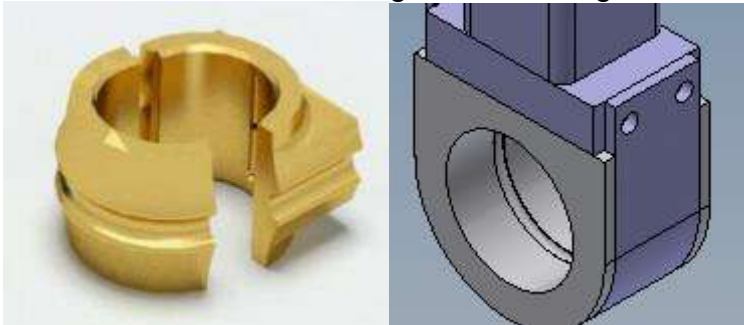
All bearings and couplings shall be checked for grease level on a daily basis. Glide bearings shall be greased as a minimum each shift.

Pillow block bearings:

Flange bearings:




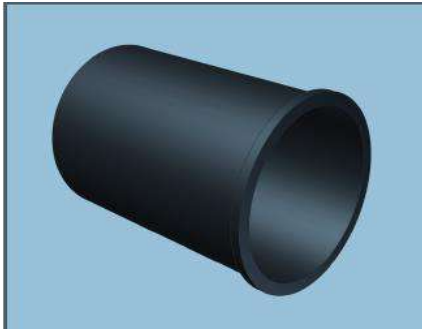
Bronze intermediate bearings: NB: To be greased every shift as a minimum:



PE or nylon intermediate bearings should be inspected after 1 week of use to determine wear. For dry, abrasive or powdery materials, bearings should be lubricated each shift to 12 hours. If material contains fat or grease, the bearing will be lubricated by the material itself and may not require lubrication. For ice transport intermediate bearings should be lubricated weekly to biweekly.

As well as greasing the intermediate bearings, attention should be paid to wear. Intermediate bearings should be replaced once wear reaches 1mm.

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PE (polyethylene) glide bearings shall be replaced when worn 3mm.

All roller bearings such as Pillow block bearings and flange bearings shall be replaced as a minimum every 5 years, to remedy the possibility of generating hot surfaces due to wear or damage.



Chain couplings as shown, or other types of flexible couplings, shall be inspected and greased for proper function and corrosion protection on a daily basis. Greasing intervals can be adjusted to operating conditions.

- b) Weekly inspection of safety systems.
- c) Monthly control of rotor, gasket/shaft sealing (and stuffing box.)
- d) Every half-year, control all the bolt connections, check oil/grease and oil level on gear, coupling and a total check of the electric system.


Only qualified personnel shall perform maintenance and repair work.

#### 4.2.2 Gear

General information to change gear oil:  
See enclosed user's manual from the producer of gear/motor.

#### 4.2.3 Cleaning

As we do not know the medium and operation condition we recommend customer to work out a cleaning procedure and instruction.  
When cleaning with water or other cleaning remedy, protect drive units and all electric components.

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#### 4.2.4 *Equipment out of service*

Also equipment out of service or daily use, has to be maintained. Intervals of maintenance and inspection may be adapted to the service, but the machine has to be regularly started or turned, and greased, to avoid corrosion to jam or damage the rotating connections. Moisture inhibitors and/or heating elements may be necessary for electric motors.

### 4.3 **Maintenance/Dismantling**

#### 4.3.1 *Maintenance*

With normal maintenance it is not necessary to dismantle the screw conveyor.

When changing bearings, rotor and other wear items, the screw has to be dismantled. Split intermediate bearings may be changed without dismantling.

Ensure that support systems, silo and hopper are empty and that starting is not possible.

Check all surrounding equipment to ensure that there is no danger for personnel

Always use suitable personal protection, like safety boots, safety goggles, helmet, ear protection, etc.

Make sure the rotor has stopped. Disable the electric fuse or safety switch with a lock-out ort similar system.

#### 4.3.2 *Dismantling*

If further maintenance/repairing are required we recommend the following instruction:


Loosen motor and gear, see also enclosed users manual from producers, and use crane or hoist when moving and handling the gear/motor and rotors.

To change/repairing of rotor: Loosen first drive unit and the end cover(s) to pull out the rotor.

Always use a crane or hoist when dismantling the machine.

**Always lubricate and grease after maintenance and dismantling.**



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## 5. Safety of Machinery

### 5.1 Applicable standards.

EU regulations for machines: 2006/42/EC

NS-EN ISO 12100:2010 Safety of machinery -- General principles for design -- Risk assessment and risk reduction

NS5639 Continuous mechanical handling equipment  
Safety code, special rules.

### 5.2 Technical documentation

Technical documentation will be kept for at least 10 years from production date.